

## **Operations & Technology Working Group Conference Call #2 Meeting Notes (FINAL)**

### ***TOPIC: RUTTING OF YELLOWSTONE'S SNOWROADS***

Call Date & Time: April 3, 2014, 1-2:30 PM MDT

Phone: 1 (877) 638-1989 Passcode: 8955346#

#### **Participation:**

##### **Present:**

Bruce Austin, Public  
Scott Carsley, Alpen Guides  
Philip Frankovic, Jackson Hole SM Tours  
David McCray, Two Top  
Alicia Murphy, NPS  
Molly Nelson, NPS  
Kim Raap, Trails Work Consulting  
Randy Roberson, Buffalo Bus  
Clyde Seely, Three Bear/See Yellowstone  
Wade Vagias, NPS  
Travis Watt, Three Bear/See Yellowstone  
Jack Welch, Blue Ribbon Coalition

##### **Not Present:**

Don Bachman, Public  
Kennedy Brown, Two Top  
Bill Howell, Yellowstone Arctic Cat Yamaha  
Jason Howell, Yellowstone Arctic Cat Yamaha  
Ed Klim, ISMA  
Jamie McCray, Two Top  
Bart Melton, NPCA  
Dan Stusek, Steve Daines' Office

#### **Review and approval of 3/10/2014 Conference Call Notes:**

Jack is re-submitting his topic ranking; his number one concern is rutting. Wade will make changes to the notes accordingly.

#### **Discussion Topic: Review of Rutting Report**

*The following overview was provided by Molly, who is an engineer for the NPS:*

*See File: NoID\_Rutting Study Results Summary (2014.03.28)*

1. Rutting is an increasing problem on Yellowstone's roads and is dangerous and impacts the visitor experience. The park did literature reviews and stakeholder interviews and consulted with the Army Corp of Engineers' Cold Regions Research and Engineering Laboratory to design the Phase I and II studies.
2. Phase I: Winter of 2012/2013: Park staff used existing roads throughout the winter to measure road conditions, density, temperatures, hardness, vehicle type, and rut depth. This is a large data set and it is still under analysis.
3. Phase II: January 2014: This study used a test track to monitor the rutting effects of multiple snowcoaches and one snowmobile over a one-week period. The goal will ultimately be to conduct a "vehicle to vehicle" comparison. That is, is one particular type of snowcoach significantly more harmful to Yellowstone's snowroads? The goal for this past season's data collection was to test the methods park staff developed. This was the initial study under Phase II, with a more refined approach potentially planned for next year.

- a. Park staff purposefully removed identifying information from the report provided to group members because it is too early to make any definitive conclusions since snow conditions varied over the week and the track's snow base was different than regular roads, which are groomed daily all season.
- b. Methodology: Monitored 10 snowmobile passes to 1 snowcoach to assess comparability; used a profilometer to determine the depth of ruts; density goes down in some places but this is not consistent, so this is a good area for more testing

### *Open discussion:*

4. Jack asked what kind of snowmobile was used in testing. Was it a touring sled? (He doesn't recognize the type in the picture.)
  - a. Wade replied that the snowmobile was a common BAT touring sled used by the NPS and many concessioners.
5. Scott asked why the park did not identify the individual snowcoaches.
  - a. Wade responded that it is too early for conclusions based on the information collected and the park doesn't want to give false, premature impressions about specific coaches. This was a small testing period with wide temperature variations and highly variable road conditions. This report focuses on the methodology utilized so that improvement can be made for future testing. Getting into the "this is better than that" discussion in terms of rutting at this point would be premature and unproductive.
6. Kim urged the park to consider each test as a "snapshot in time" so it is very important to document weather and snow variables. In 2006, Kim did testing on 15 sites in 6 states with wide temperature variations—it's just a part of doing snowmobile testing. Conditions will never be exactly the same. He said that it is important that the park identify OSVs soon so that we can start making decisions—we will have impressions of what differences will result from temperature changes, but we should let the data speak for itself.
7. Wade asked if we are using a similar methodology that Kim has done in WI.
  - a. Kim said yes, this is a good start. The park needs more focus on the quality of the groomed roads—he has seen poor grooming practices on all the roads over the years. "Cut and fill" of moguls or ruts in the grooming process is a fallacy and will not successfully remove them because of the "memory" in the snow. This calls into question that any OSV is the culprit of rutting. Kim would like to add grooming practices to the topic list for WUAM. In response, Wade said that yes, we need a 2-pronged approach to snowroads—appropriate OSVs and good grooming. However, he noted, really hard-packed roads, which may be good for OSVs, are also very difficult to plow in the spring.
8. Philip asked if rutting tests are going to be conducted at the south gate next year since there is deeper and softer snow there (though he noted that conditions were pretty good there this year).
  - a. Wade replied that because there are so many more snowcoaches coming and going from West, that is where testing has been focused. Jack mentioned that Bombardiers can cause rutting on the inclines near Lewis Falls because of their heavy loads.
9. Bruce suggested that for Fig. 8, it may be helpful to at least know the type of track or assembly. Molly also clarified that Fig. 9 depicts density vs. passbys and said that she will add

a legend to this graph and send the graph to Bruce. Bruce asked if we could have a table that correlates compression and snow displacement, which may point to how the snowcoach weight impacts ruts. Molly agreed that this would be an interesting analysis.

10. Wade said that sugar snow and other layers in the test track, since it wasn't groomed from the beginning of the season, likely skewed the data. Kim mentioned that he feels the test track is the weakest part of the test so it is hard to have a good comparison. He suggests that the test track, in addition to being groomed on the same schedule as main roads, needs to have regular traffic—both wheeled (before grooming for OSVs starts) and OSV traffic. In response, Molly and Wade said that next year we may want to set up a track that has regular traffic.
11. Kim asked how many days per season we have to do the testing. Wade replied that we have 3-5 OSVs in the fleet that we will test over varying weather conditions over the season to determine blatant "bad apples" in the fleet. Kim suggested that instead of using a track, we should consider using a well-used road segment to see real conditions.

**Action(s) on the Rutting Study:**

1. Molly will send the updated graph to the entire working group.

**Discussion Topic: Review of Bruce's White Paper on Rutting**

**Open Discussion:**

1. Bruce: The park has much more data than he (Bruce) realized when he wrote the paper and he thinks the park has made a great start on understanding road rutting. Bruce is open to edits to the paper and asks the group to provide feedback.
2. Jack commended Bruce for putting the information together but is confused by the conclusion.
  - a. Bruce replied that heavier machines cause more ruts, and since more demand for ridership leads to heavier, bigger vehicles, we may need to consider other ways to transport people or monitoring the number of people in each vehicle; one heavier vehicle is disproportionately impactful than 2 lighter vehicles.
3. Randy agreed that a weak base can make a heavy vehicle fall through more easily, but suggested that in theory, with a good groomed road, track type is much more important than vehicle weight.
  - a. Bruce agrees that large vehicles make grooming more critical. Wade mentioned that the groomer tractor, which is a heavy agricultural John Deere tractor, does not seem to displace as much snow and leaves clearer prints than a van with mat tracks. Vans result in higher snow displacement and the snow is more aerated. Therefore, we can have impressions of how vehicles impact the roads, but we need more data. For instance, in the past, the NPS suggested pounds/inch<sup>2</sup> as a limiting factor for OSVs, but the data isn't there to uphold those restrictions.
  - b. Wade mentioned that we don't yet have data to know what vehicle causes the worst ruts, but we're getting close to having a methodology that will help us figure it out.
  - c. Clyde asked what is the difference is in weight between groomers and vans, and Wade is not sure.
  - d. Randy asked Wade if he has noticed GripTrac prints in the snow (similar to those from the groomer) when Randy's buses pass. Wade replied that yes, they tend to travel at slower speeds, there is less splashing effect, and the footprint is clear.

- e. Clyde mentioned that in some cases heavy OSVs cause ruts and smaller ones, even with Mattracks, don't.
  - f. Scott countered that it is not always the weight or footprint, it's how the tracks move the vehicle forward—it's the spinning that causes ruts, especially on hills.
  - g. Bruce agrees that many factors, including track design, ultimately have a greater impact than the number of passengers.
4. Jack wondered if locking differentials instead of non-locking would provide more even power. However, Bruce and Randy said that locking differentials may actually produce deeper ruts on turns due to slippage. Jack asked if Randy's big coaches have open differentials and Randy replied that they do. (see last section of these notes for additional clarification).
5. In conclusion,
- a. Wade said that he has gotten calls complaining about every type of OSV, but without hard data, we can't say which is "best" to preserve the park's roads. The goal of this group is not consensus; the goal is robust discussion, which this paper has spurred.
  - b. Wade suggested that the group use Bruce's paper to come up with research questions and use this as a tool to move the discussion forward. Wade would like Bruce to take a run at a re-write of the paper and at the end of each paragraph, pose a research question to make this even more of a discussion paper. Wade, Molly, and Alicia will then read the paper and send it out to the group for further review.
  - c. Wade also informed the group that the park is not interested in changing winter use management from transportation events back to numbers of people (as suggested in Bruce's discussion paper).

***Additional thoughts on the topic of snowroad rutting received post-conference call (via email):***

**Scott Carsley:** I believe the term "Snow Displacement" is being used differently in Austin's paper and in the NPS testing. Bruce essentially describes it as the amount of snow removed from the trail after a vehicle pass-by and the NPS tests measure displacement as a factor of distance from the original road surface - i.e. rut depth. Obviously rut depth is a factor of the amount of snow removed from that part of the snow surface as well as compression. I think these need to be clarified as we move forward. Measuring the amount of snow removed from the road surface poses considerable obstacles but I believe is an important part of the equation. Looking back at the profilometer graphs, maybe this could easily be obtained from the snow depth increases from the track edge outward to the edge of the measured area.

I think I understand the rationale behind the NoID test results for your Vehicle - by - Vehicle study. You wanted us to focus more on the methodology rather than results. Our discussion pretty much covered the methods of the test but skimmed around their presentation which I think may be as important as the process. I believe the report furnished us is excerpted from a longer report and these details might be there so I apologize if this is uninformed or redundant.

-Vehicle types and numbers need to be identified. Your audience should know the type of snowmobile, and the type of snowcoach or snow van being tested. Is it a MatTrax on a converted 4X4 van or on a Suburban, Chevy or Ford?

-Vehicles should be properly weighted to more closely represent their actual lbs per sq inch during their use cycle.

-All roads basically have two-way traffic but the majority of travel is in the correct lane leading to unidirectional travel. A circular course so that all travel was in the same direction may give more accurate results????

-Figure 6 - When were the densities of test tracks a & b measured? After grooming, after testing was concluded or sometime in between?

-I think you need to be consistent with your figures and the number of vehicles they represent. We don't even know how many vehicles you tested. Figure 9, if I'm reading it correctly indicates 7 vehicles were tested, Figure 8 has results for 4 vehicles and your profilometer shows 3 results.

Many vehicles do fine on flat hard roads but will start spinning tracks as the grade is increased displacing more snow to the sides and everywhere else digging deeper ruts. Firehole Canyon and the travel restrictions there are implemented for this reason. If we are to use these test results as part of the equation for reducing road ruts it may be beneficial at some point to include a grade in the test track or field observations similar to phase 1 of your testing. By the way, there have been a couple of vans and small buses that slipped badly on hills and sometimes on the flats. The hill at Mule Shoe Bend is where I remember them being most obvious.

Peer review is important in any scientific procedure and accompanying results. Circumventing that procedure will discredit the results. This process has to be totally transparent with full disclosure and not just of the results that are preferred. I think most folks on the conference call the other day felt like information and results are being withheld. I hope this does not continue throughout our process. Of course my panties are still in a bit of a bundle regarding the withholding of the sound test results. It's hard to look at new technologies and make informed decisions on their effectiveness and future utilization if you can't even get information on their performance.

**Don Bachman:** Re. Rutting, I'd agree from the discussion that testing should be done on regular traffic route to ensure replication of operational conditions. ...and a review of grooming practices would be helpful. I'm way behind the times on grooming techniques but aware of various possibilities as to use of blade, weight and depth of penetration of rear implement and frequency.

**Randy Roberson:** While a closed, or locking differential will disturb the surface more than an open differential on tight turns, It should be put into perspective... An open differential, especially a two wheel drive vehicle, will disturb the snow surface not only as much, but in all driving conditions ( whether turning, or straight ahead). The added benefit of reduced spinning (lockers) outweighs the negatives from a few tight turn scenarios per day.

Elsewhere in the notes, it states that “spinning tracks displace snow causing ruts” While that is technically accurate, I contend that as much or more rutting is caused by the vehicles that churn up and aerate the snow, so that when other vehicles follow, it is they that are displacing the snow, but are not completely the culprits. Mattracks, the most widely used track system in the Park, have a very steep approach angle, and by design, can really “toss” out the snow.

The weight of larger coaches, Bombardier track grousers, snowmobile carbides and spinning tracks, Mattrack approach angles and excessive 2wd spinning, tank tracks with excessive track back flex all attack the snow surface. One must consider the cost of replacing or eliminating vehicle or track types vs. better grooming practices, or both?

***Actions on the Bruce's Rutting Paper:***

- 1. Bruce will provide a re-write of the paper—he welcomes feedback from the group during this process.*
- 2. Wade, Molly, and Alicia will edit the paper before sending it back out to the group for further review. If ongoing investigations into rutting is deemed a priority by Yellowstone National Park managers, then this white paper, along with the notes above and previous methods will be used to inform the scientific methods utilized.*

***General Actions (in Addition to Topic-Specific Actions Above):***

- 1. CONCLUDED: By COB Friday April 11, 2014, working group members must complete the doodle poll for our next conference call (next topic: Speed Limits. Call is scheduled for Monday, April 28, 2014 from 2-3:30 PM)*
- 2. CONCLUDED: By COB Friday, April 18th, 2014, group member's comments are due back on these draft notes. Late comments will not be accepted.*